Development and Validation of the Medication Administration Error Reporting Survey

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Abstract

Analysis of medication errors can lead to system improvement and reduced risk only if the errors are detected, reported, and used to design better patient-care practices and systems. Voluntary medication error reporting systems rely on the ability and willingness of individual physicians, pharmacists, and nurses to detect and report errors as part of their routine practice. Because of the central role nurses play in medication administration, it is important to understand their perceptions of the medication error reporting process. This paper describes the development and validation of a survey designed to measure nurse perceptions of medication administration error (MAE) reporting. The survey contains questions in three general content areas: why medication errors occur; reasons why medication errors are not reported; and the estimated percentage of medication errors actually reported. Over the past 10 years, the MAE survey has been administered four times to nurses in Iowa's acute care hospitals statewide. Principal components exploratory-factor analysis with orthogonal rotation was used to determine if the individual items could be combined into subscales. Five subscales emerged for "reasons why MAE occur"; four subscales emerged for "reasons why MAE are not reported." Subscale reliability was assessed using Cronbach's Coefficient Alpha. Although health care organizations have implemented continuous quality improvement programs that focus on systems, rather than individuals, barriers remain in MAE reporting. Surveys, such as the one described here, provide a basis to begin discussions about improving the system.

Introduction

Analysis of medication errors can lead to system improvement and reduced risk only if the errors are detected, reported, and used to design better patient care practices and systems. Although several approaches currently exist to identify the occurrence of medication errors (e.g., retrospective medical record reviews), medication errors are primarily identified through passive, voluntary reporting systems. Voluntary medication error reporting systems rely on the ability and willingness of individual physicians, pharmacists, and nurses to detect and report errors as part of routine practice. Factors that reduce the potential for reporting medication errors are management practices and professional cultures that punish an individual when errors are reported, even when the error is the result of poorly designed systems. Thus, there is significant underreporting of medication errors. The result is a significant decrease in the amount and quality of information that

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could be used to improve existing patient care systems and prevent future errors. Valid, reliable, and complete information about actual and near-miss medication errors is a prerequisite to designing systems that prevent future occurrences. Because of the central role nurses play in medication administration, it is important to understand nurses' perceptions of the medication error reporting process. This paper describes the development and validation of a survey designed to measure nurse perceptions of medication administration error (MAE) reporting.

Conceptual underpinnings

Patient safety encompasses a wide variety of patient care processes and outcomes, including the safe use of surgical procedures, medications, physical and chemical restraints, and the prevention of harmful events, such as patient falls and suicide. Drug therapy is the most common intervention prescribed by physicians, and the distribution and administration of medication represents a major duty of hospital-based pharmacists and nurses. It has been reported that, during a 51-day period on three medical units in a large teaching hospital, 11,602 medication orders were written—comprising almost 7 medication orders per patient day and close to 31 medication orders per patient admission.[1] The few large studies to date that have focused on adverse events in hospitals found that the use of medications represents the second most common patient-related safety problem.[2–6] Because there is potential for an error to occur with each dose of medication, it is imperative that such errors are detected and reported. Although errors can occur during the prescribing and dispensing phases, the MAE survey focuses on errors in medication administration.

Why medication administration errors occur

Several conceptual categories have been proposed for why medication administration errors occur. These categories include individual staff characteristics (knowledge and skills); policy- and procedure-related issues; communication; and systems issues.[7–14]

Individual staff characteristics that contribute to medication errors include lack of knowledge of the patient, or the patient's diagnosis, and the names, purposes, and correct administration of the medication.[7, 8, 10] They can also include not knowing how to operate intravenous (IV) pumps/infusion devices, mistaking IV lines for nasogastric tubes, poor medication calculation skills, and failure to adequately prepare medications before administration.[7, 8, 10–14] Monitoring errors may also be included in this category (i.e., failure to monitor for side effects because of lack of a knowledge).

Issues related to policies and procedures can include both the absence of, failure to follow, policies and procedures.[7, 8, 10] Failure to follow policies and procedures results in lack of attention to safeguards intended to prevent errors in medication administration procedures, e.g., not checking patient identification or allergy identification wristbands,[10] not checking the medication against the

medication administration record (MAR),[9] and receiving medications late from the pharmacy.[15] Lack of standard protocols for the administration of high-risk medications, such as respiratory muscle relaxants, chemotherapeutic drugs, and antiarrhythmics, may also result in MAEs.[13]

Failure in communication is the third category of reasons why MAEs may occur. This may include transcription errors, use of abbreviations, illegible handwriting, incorrect interpretation of physician's orders, use of verbal (as opposed to written) orders, failure to document medications given or omitted, and unclear MARs.[7–16] Inadequate order-writing by physicians is also a potential source of communication failure.[17, 18] In one study of 865 medication orders written in a 24-hour period, only 92.7 percent of the orders stated the dose, 90 percent specified the route of administration, 87.9 percent stated the frequency of administration, 83 percent of 276 PRN ("give as needed") orders within the study period stated the indication for the medication, and more than 50 percent of the orders were written using abbreviated names for the medication.[17]

The fourth category of reasons why medication errors may occur includes systems issues. One systems issue is workload and type of care delivery system, and includes factors such as number of consecutive hours worked, rotating shifts, staffing mix and numbers, nurse-to-patient ratios, distractions and interruptions,[7–12, 15] assignment of floating nurses to unfamiliar units, and hospital- and pharmacy-design features.[16] Also, information resources, such as published drug guides, may not be readily available or up to date.[8, 10] Finally, drug manufacturers contribute to medication errors by producing look-alike and sound-alike drug names, confusing and unclear labeling, confusing packaging of doses (e.g., multidose vials, similar packaging for different medications), poor design of delivery systems, or failure to specify drug concentrations on dose calculation charts.[9, 13, 14]

Why medication administration errors are not reported

There are four purposes for gathering data on medication errors. These are to (1) detect errors; (2) estimate the frequency of specific errors; (3) assess the effects of changes to the system; and (4) monitor system performance over time.[19] While there are several available approaches to gathering data on medication errors, voluntary reporting is the most common. The voluntary reporting processes generally involve four basic steps: (1) error recognition; (2) assessment of the need to report the error; (3) incident report preparation; and (4) followup response by the party receiving the report. While this four-step process is relatively straightforward, there are a number of factors that may prevent reporting. First, by definition, recognition that an error has occurred means that the error happened some time previous to its discovery. This usually means the clinician must be able to detect an error, based on the documentation in the patient's medical record. Because of this, recognition that an error has occurred is very difficult.[20] Second, even if an error is detected, the clinician must decide whether or not it should be reported. Some errors, such as not receiving one dose of a vitamin or receiving it late, may be so trivial as to not require reporting. Other

errors, such as patients not receiving medications at the prescribed time, may happen so often it is actually considered to be normal practice.[21]

One of the difficulties surrounding the reporting of medication administration errors is the varying terminology and definitions used by practitioners.[7, 8, 10] The American Society of Health-System Pharmacists (ASHP) recently published standard definitions of iatrogenic events related to medications.[22] A *medication error* is defined as any *preventable* event that *may* cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer. Although this definition is widely available, our work indicates considerable variation exists in the use of specific performance measures and unique operational definitions for medication-related performance measures.[23] As such, inconsistent operationalization of the definitions of medication errors may limit error reporting.[24]

Third, the clinician must also assess the effort and potential personal cost associated with completing an incident report. If the reporting process requires a significant amount of effort, it is less likely that "minor" errors will be reported.[25] There may also be a personal cost in that it may be difficult to report peers' errors either because they are good friends and coworkers, or because the reporting clinician recognizes that she/he is just as likely to make the same type of error. Finally, the administrative response to a reported medication error may also act as a deterrent to reporting. If medication errors are used as an indicator of an individual's performance or in a punitive manner, colleagues may be reluctant to report their own or others errors.[15, 16, 26, 27]

Even though it has been suggested that punishment has little effect on future error prevention,[28] some managers continue to focus on the disciplinary aspects of reporting medication errors. Since nurses administer medications, the final step in a series of activities leading to patients receiving medication, they are often "blamed" for errors that may have occurred along the way.[29] In one approach, each medication error results in a verbal counseling session for the nurse.[30] Other systems track individual errors and institute counseling when a certain number of errors are committed, or "points," are accumulated.[31–34] While the primary advantage of a point system is reported to be equal treatment of staff, one must still question the willingness of staff to report errors under such circumstances. In particular, since not all nurses administer the same number of doses of medications—i.e., some nurses may more frequently be assigned to be the "medication nurse"—some nurses will have more errors simply due to the increased exposure to administering more doses. Almost universally, managers proclaim that data gathered through incident reporting systems are not to be used in a punitive manner, but instead to improve patient care. In reality, this is not the case.[35–38]

Studies by pharmacists also have found decreased reporting of errors in environments where error rates are used as a performance measure; this has been called an "honesty tax" for accurate reporting.[16] In the most comprehensive study of adverse drug events to date, investigators went to great lengths to assure anonymity in reporting in order to gather accurate information.[1, 39] Only when

those reporting errors perceive a sense of commitment to quality improvement by the manager can a positive tone for error prevention be established.[16]

Leape argues that the most important reason physicians and nurses have not developed more effective means for preventing errors is that they find it difficult to accept errors. [40] Both physicians and nurses are socialized as students—and, later on as, practicing professional—to strive for error-free practice. When errors occur, they are likely to be viewed as failures of character (i.e., the error occurred due to negligence and is regarded as someone's fault, as opposed to a learning opportunity). Corrective measures have traditionally been aimed at the individual to ensure that he/she does not commit the same error again, rather than focusing on the underlying cause of the error.[40] Nurses do not see error reporting as a learning opportunity, resulting in significant underreporting of medication errors.[15, 26, 27, 41, 42]

Survey development

The survey was initially developed and pilot tested in one hospital as an internal quality improvement initiative. At the time the survey was developed in 1993, there was little substantive research on medication error reporting. Thus, an inductive process was used to develop survey items. The instrument was developed by an experienced quality improvement clinician and a health services researcher. Based on the existing literature and clinical experience, items were constructed to reflect the most common reasons MAEs occur, why they are not reported, and the estimated extent of reporting. A panel of nurse experts reviewed the items and, following revisions, the survey was pilot tested on several nursing units in one hospital. After minor revisions, the survey was initially distributed to the study hospitals in 1994. Based on an updated literature review and feedback, 10 items were added to the "Reasons Errors Occur" section in 1996.

The survey is a paper-and-pencil instrument.* Our experience indicates that it takes less than 10 minutes to complete the survey. The survey instrument contains questions regarding nurses' perceptions in three general content areas:

1. Reasons why medication errors occur (19 items in 1994 and 29 in subsequent surveys).
2. Reasons why medication errors are not reported (16 items).
3. Estimated percentage of medication errors actually reported.

For the first two sections, respondents indicate agreement with each item using a Likert-type scale, where responses range from 1 = strongly disagree to 6 = strongly agree (Figure 1a). In the third section, respondents are asked to estimate the percentage of errors reported on their respective units for specific types of non-IV and IV-related errors using a 10-point scale. Each point on the scale represents a range of the percentage of MAEs being reported (e.g., category 2 = 21 to 30 percent) (Figure 1b). Respondents are also asked to make a global

* A copy of the complete survey is available from the corresponding author.

Figure 1a. MAE survey

A. Reasons Why Medication Errors Occur On Your Unit. Please circle the number that best reflects the extent to which you agree that the following reasons contribute to why medication errors occur on your unit.

	Strgly Disagr	Mod Disagr	Slightly Disagr	Slightly Agree	Mod Agr	Strgly Agree
1. The names of many medications are similar.	1	2	3	4	5	6
2. Different medications look alike.	1	2	3	4	5	6
3. The packaging of many medications is similar.	1	2	3	4	5	6
4. Physicians' medication orders are not legible.	1	2	3	4	5	6

B. Reasons Why Medication Administration Errors Are Not Reported On Your Unit. Please circle the number that best reflects the extent to which you agree that the following reasons contribute to why errors are not reported on your unit.

	Strgly Disagr	Mod Disagr	Slightly Disagr	Slightly Agree	Mod Agr	Strgly Agree
30. Nurses do not agree with hospital's definition of a med error.	1	2	3	4	5	6
31. Nurses do not recognize an error occurred.	1	2	3	4	5	6
32. Filling out an incident report for a med error takes too much time.	1	2	3	4	5	6

Figure 1b. MAE survey

C. Percentage of Each Type of Error Reported. Considering each type of error individually, please circle the number that best represents what percentage of that type of error is actually reported on your unit.

	Percentage Reported									
Types of Non-IV Medication Errors	0 - 20	21- 30	31- 40	41 - 50	51 - 60	61 - 70	71 - 80	81 - 90	91 - 99	100
46. Wrong route of administration	1	2	3	4	5	6	7	8	9	10
47. Wrong time of administration	1	2	3	4	5	6	7	8	9	10
48. Wrong patient	1	2	3	4	5	6	7	8	9	10
49. Wrong dose	1	2	3	4	5	6	7	8	9	10
Types of IV Errors										
55. Wrong method of administration	1	2	3	4	5	6	7	8	9	10
56. Wrong time of administration	1	2	3	4	5	6	7	8	9	10
57. Wrong patient	1	2	3	4	5	6	7	8	9	10
58. Wrong dose	1	2	3	4	5	6	7	8	9	10

estimate of the percentage of all the non-IV and IV errors reported on their respective units.

To score the survey, means and standard deviations can be calculated for individual items or subscales (described in subsequent sections) for the first two sections of the survey. Subscale values are calculated by adding the value for each item and dividing by the number of items in the subscale, i.e., calculating the mean of the items in the subscale. For the third section, the estimated percentage of errors reported was represented by the frequencies for each percent increment.

Survey respondents

Over the past 10 years, the MAE survey has been administered four times to nurses in Iowa's acute care hospitals. Data from the 1994 survey have been reported,[26, 42] while only data on why errors are not reported and the estimated percent reported have been published from the 1996 survey.[27, 43] Results from the 1998 and 2001 surveys have not been previously published.

For all four surveys, participating hospitals were recruited through The University of Iowa's Institute for Quality Healthcare (IQH), which promoted the study as one of its quality improvement initiatives. Individual hospitals were responsible for deciding which units and nurses received the surveys. Some hospitals surveyed each nurse working on each unit, whereas others hospitals sampled only particular units or nurses. Thus, the studies employed a non-random convenience sample. Once completed, each hospital collected and forwarded the surveys to the IQH for data entry and analysis. Demographic data from participating nurses is contained in Table 1.

Table 1. Description of study samples

	1994 Survey N=1384	1996 Survey N=1428	1998 Survey N=862	2001 Survey N=295
Type of Hospital				
Rural	304 (22%)	558 (39%)	323 (37%)	242 (82%)
Rural referral	345 (25%)	436 (31%)	119 (14%)	53 (18%)
Urban	735 (53%)	434 (30%)	420 (49%)	0
Education Level				
Licensed practical nurse	107 (8%)	122 (9%)	59 (7%)	20 (7%)
ADN/diploma	935 (68%)	966 (71%)	575 (69%)	211 (72%)
Bachelor of Science	259 (19%)	270 (20%)	196 (23%)	59 (20%)
Advanced-degree RN	14 (1%)	11 (1%)	11 (1%)	2 (1%)
Type of nursing unit				
Medicine	252 (18%)	169 (12%)	127 (15%)	0
Surgery	190 (14%)	161 (11%)	87 (10%)	0
Combined med-surg	166 (12%)	298 (21%)	205 (24%)	237 (80%)
Special care units	242 (18%)	194 (14%)	158 (18%)	25 (8%)
Obstetrics	120 (9%)	167 (12%)	88 (10%)	28 (9%)
Pediatrics	118 (8%)	43 (3%)	9 (1%)	0
Specialized other (ER, Psych, etc.)	278 (20%)	268 (19%)	99 (11%)	0
Other or not identified	18 (1%)	128 (9%)	89 (10%)	1 (<1%)

In 1994, a total of 1,384 usable surveys were returned from 24 hospitals; in 1996, 1,428 usable surveys were received from nurses in 29 Iowa hospitals; 862 surveys were returned from 21 hospitals in 1998; and 295 surveys were returned from 16 hospitals in 2001. The distribution of respondents from rural, rural referral, and urban hospitals in Iowa is included in Table 1. Respondents were primarily registered nurses, with approximately 70 percent having an Associate's Degree or Hospital Diploma as their basic nursing education. The sample contained fewer than 10 percent licensed practical nurses, and fewer nurses with advanced degrees. This response distribution approximates the distribution of nurses throughout Iowa, and all four samples reflected the major types of nursing units one would expect to see in acute care hospitals.

Psychometric properties

Scale development

The unit of analysis was the individual nurse. Descriptive statistics were used to analyze the response to individual items and the respondents' characteristics. All analyses reported here use the entire sample; no subgroup analyses are presented. Principal components exploratory-factor analysis with orthogonal rotation was used to determine if the individual items could be combined into subscales. An Eigen value criterion of 1.0 or greater was used to establish the subscale factors. Individual items needed a factor loading of .40 or greater to be included in the factor.

Items that loaded together on a given factor were formed into subscales with equal weighting. The subscale values were defined as the mean of the component items. In the first content area, "why MAEs occur," five factors emerged. In the second content area, "why MAEs are not reported," four factors emerged. These factors will be discussed at greater length in the validity and reliability sections below. These analyses were performed using the Statistical Analysis System (SAS Institute, Inc.; Cary, NC). Table 2 contains the factors and their constituent items, as well as the descriptive statistics for the subscales across the four administrations of the survey. It should be noted that for the third content area, "estimated percentage of MAEs actually reported," individual item data were used; no subscales were created. Table 3 identifies the individual items for each factor.

Validity

When the initial survey was designed, and subsequently refined, individual items were reviewed and assessed for face validity. After the subscales were initially created using exploratory factor analysis, they were also reviewed and assessed for face validity. After the subscales were finalized, confirmatory factor analysis was used to establish construct validity.[27]

The five subscales that emerged for "reasons why MAE occur" are:

Table 2. Subscale reliability measures, means, standard deviations

Subscale	Cronbach's alpha				Mean				Standard deviation				Test-retest r
	1994*	1996	1998	2001	1994*	1996	1998	2001	1994*	1996	1998	2001	
Why errors occur													
Physician communication		.83	.85	.83		3.8	3.8	3.8		1.0	1.0	1.0	.76
Medication packaging		.82	.83	.81		3.7	3.8	4.1		1.2	1.2	1.2	.77
Transcription-related		.90	.92	.88		3.1	3.1	3.1		1.2	1.3	1.3	.52
Pharmacy processes		.89	.89	.91		2.7	2.6	2.5		1.2	1.1	1.1	.73
Nurse staffing		.73	.74	.62		3.5	3.5	3.6		1.1	1.1	1.0	.65
Why not reported													
Disagreement over error	.76	.77	.76	.76	3.2	3.0	3.0	3.1	1.2	1.1	1.1	1.1	.69
Reporting effort	.79	.86	.84	.82	3.2	2.9	3.0	3.0	1.3	1.4	1.3	1.3	.67
Fear	.85	.86	.87	.87	3.5	3.4	3.5	3.5	1.2	1.2	1.2	1.2	.78
Administrative response	.74	.74	.78	.69	3.6	3.4	3.5	3.5	1.1	1.1	1.1	1.0	.72

*Because 10 items were added to the Why Errors Occur subscale after the 1994 survey administration, data for 1994 are not reported. Data have been published.[42]

Table 3. Survey items within subscales

Why medication errors occur

Physician communication

- Physicians' medication orders are not legible.
- Physicians' medication orders are not clear.
- Physicians change orders frequently.
- Abbreviations are used instead of writing the orders out completely.
- Verbal orders are used instead of written orders.
- Poor communication between nurses and physicians.

Medication packaging

- The names of many medications are similar.
- Different medications look alike.
- The packaging of many medications is similar.

Transcription-related

- Medication orders are not transcribed to the Kardex correctly.
- Errors are made in the Medication Kardex.

Pharmacy processes

- Pharmacy delivers incorrect doses to this unit.
- Pharmacy does not prepare the med correctly.
- Pharmacy does not label the med correctly.

Nurse staffing

- Nurses get pulled between teams and from other units.
- Nurses are interrupted while administering medications to perform other duties.
- Unit staffing levels are inadequate.
- All medications for one team of patients cannot be passed within an accepted time frame.

Why medication errors are not reported

Disagree with definition

- Nurses do not agree with hospital's definition of a medication error.
- Nurses do not recognize an error occurred.
- Medication error is not clearly defined.
- Nurses may not think the error is important enough to be reported.

Reporting effort

- Filling out an incident report for a medication error takes too much time.
- Contacting the physician about a medication error takes too much time.

Fear

- Nurses believe that other nurses will think they are incompetent if they make medication errors.
- The patient or family might develop a negative attitude toward the nurse, or may sue the nurse if a medication error is reported.
- Nurses are afraid the physician will reprimand them for the medication error.
- Nurses fear adverse consequences from reporting medication errors.
- Nurses could be blamed if something happens to the patient as a result of the medication error.

Administrative response

- No positive feedback is given for passing medications correctly.
- Too much emphasis is placed on med errors as a measure of the quality of nursing care provided.
- When med errors occur, nursing administration focuses on the individual rather than looking at the systems as a potential cause of the error.
- The response by nursing administration does not match the severity of the error.

- Medication packaging
- Nurse staffing
- Pharmacy processes
- Physician communication
- Transcription-related

The four subscales that emerged for "reasons why MAE are not reported" are:

- Administrative response
- Disagreement over definition
- Fear
- Reporting effort

Criterion-related validity is established through concurrent comparison to other measures of the same construct. In 1993, when the survey was initially developed, there was very little research on medication error reporting or medical errors, and no other surveys existed to measure them. However, an alternate method to establish criterion-related validity is correlations with other attributes believed to be related to the construct. Thus, we conducted a pilot study to explore the relationships among measures of nurses' perceptions of organizational culture, continuous quality improvement (CQI) implementation, and medication administration error (MAE) reporting. The data from this pilot study support the criterion-related validity of the subscales.[44] For example, there was a positive correlation between hierarchical culture types and reasons why MAE were not reported, including the subscale "fear."

Reliability

Subscale reliability was assessed using Cronbach's Coefficient Alpha, as described in the previous section. Overall, the internal consistency for each subscale is within acceptable ranges. Table 2 presents reliability data in more detail.

Test-retest reliability was assessed for the subscales using a sample of registered nurses who were enrolled in a graduate-degree nursing program. Following approval by the Institutional Review Board, faculty agreed to allow the investigators to approach students at the end of a regularly scheduled class period. Students who agreed to participate signed a consent form and completed the survey. Approximately 3 weeks later, the same students completed a second survey at the end of the class period. The student received a small cash incentive for completing each survey ($5 per survey). The correlation (Pearson's *r*) of scores from Time 1 and Time 2 were used to assess test–retest reliability. Fifty-three participants completed surveys at both Time 1 and Time 2. The correlations for the subscales ranged from 0.53 to 0.78 (Table 2).

Potential uses of the survey

Medication administration processes and error reporting are complex processes. Use of this survey can assist in quality improvement efforts in several ways. The survey can be used to:

- Provide staff with a means of confidential input into the current medication administration processes and reporting culture.
- Identify the relative rankings of the mean scores for individual items/subscales to determine intervention priorities for improving medication administration processes and reporting.
- Compare the mean scores for individual items/subscales across units within hospitals or between hospitals within systems to assess relative differences in perceptions of medication administration processes and reporting, to appropriately target improvement interventions.
- Compare the mean scores for individual items/subscales between staff and managers, to assess the direction and magnitude of differences in perceptions of medication administration processes and reporting.[42]
- Compare the mean scores for individual items/subscales at baseline and following interventions designed to improve medication administration processes and/or reporting.
- Assess the patient safety culture in combination with other measures, e.g., extent of implementation of continuous quality improvement.[44]

Limitations

The survey has been tested only in Midwestern acute care hospitals with an interest in participating in a quality improvement consortium. The survey applies only to nurses, who are the primary professionals who *administer* medications. Thus, it does not directly address errors in *prescribing* or *dispensing* medications. The survey instrument relies on nurse perceptions, thus determination of the actual reasons errors occur or are not reported and are beyond the scope of the survey.

Conclusion

When medication errors are not reported, the potential to avoid future preventable errors is greatly reduced. Thus, potentially avoidable adverse outcomes—such as increased morbidity and mortality, as well as resource utilization—will result.[45, 46] Without the knowledge gained by analyzing a series of medication errors, it is impossible to separate special cause from common cause errors and to enhance the overall effectiveness of the medication delivery system. Finally, the lack of high quality medication error data reduces the institution's risk management capabilities.[47, 48]

Although health care organizations have implemented continuous quality improvement programs that focus on systems, rather than individuals, barriers remain in MAE reporting. It is critical that not only the data, but the reporting processes themselves, be carefully evaluated as part of any quality improvement initiative. While it is unrealistic to expect a zero error rate, a culture that supports identification and reporting of adverse events (one that "drives out fear") will enhance quality improvement initiatives. Without open and supportive organizational, professional and work group cultures—each of which encourages a systems rather than individual orientation to error reduction—quality improvement efforts are likely to come up short. Surveys, such as the one described here, provide a basis to begin discussions about improving the system.

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